The work of the two philosophers was, in fact, complementary, and the extraordinary development in recent years of physical chemistry must be attributed to the cooperative influence of their concurrent views.

DARWIN MEDAL.

Mr. Francis Galton, F.R.S.

The Darwin Medal is conferred upon Mr. Francis Galton for his numerous contributions to the exact study of heredity and variation contained in "Hereditary Genius," "Natural Inheritance," and other writings.

The work of Mr. Galton has long occupied a unique position in evolutionary studies. His treatise on "Hereditary Genius" (1869) was not only what it claimed to be, the first attempt to investigate the special subject of the inheritance of human faculty in a statistical manner and to arrive at numerical results, but in it exact methods were, for the first time, applied to the general problem of heredity on a comprehensive scale.

The work thus begun was continued and extended in a long series of publications (*see* Bibliography in "Natural Inheritance," pp 219-20), conspicuously in "Natural Inheritance" (1889), a publication which marks a distinct advance in these studies, both by definition of the problems of variation and heredity and by the introduction of novel methods. Subsequently Mr. Galton, with a greater emphasis, enunciated (Roy. Soc. *Proc.*, vol. lxi., 1897, p. 401) the central conclusion to which his long investigations had led him, in the form universally familiar to biologists as "Galton's Law of Heredity," a principle now recognised as of wide application in nature.

Contributing to the total of Mr. Galton's work, numerous other subjects might be mentioned, which he has elucidated with a genius peculiarly Darwinian. In all his researches he has been a pioneer, and indeed, with the single exception of Quetelet, we may almost say that no one preceded him. His work is generally acknowledged to constitute a new departure in biology, and to form a natural continuation of Darwin's labours. Besides their intrinsic value, the special charm of his writings has exercised a notable influence on the minds of others, stimulating them to work in the same fields. It may safely be declared that no one living has contributed more definitely to the progress of evolutionary study, whether by actual discovery or by the fruitful direction of thought, than Mr. Galton.

BUCHANAN MEDAL.

Dr. Sydney A. Monckton Copeman.

The Buchanan Medal, awarded every five years for distinguished services to hygienic science or practice, is given to Dr. Sydney A. Monckton Copeman for his experimental investigations into the bacteriology and comparative pathology of vaccination.

Dr. Copeman is well known, both in this country and abroad, for his contributions to the scientific basis and practice of preventive medicine. His earliest work in this field was an investigation into lead poisoning from drinking water in Yorkshire. The importance and value of his "Report to the British Medical Association" was such as to at once attract the notice of the late Sir George Buchanan, and he was shortly after appointed one of Her Majesty's Inspectors on the Local Government Board. Then he commenced, and in such leisure time as official duties have left him has continuously prosecuted with remarkable success, important researches into the nature of the vaccine *virus*, and on the contaminations, bacterial and other, of vaccine lymph. His work has, besides results of theoretic importance, brought practical results in the form of great improvements in the storage and preservation of lymph used in this country. He has also shown the possibility of obtaining useful vaccine lymph by passage through animals other than the calf. It may also be added that he has contributed a considerable amount of knowledge to the physiological chemistry of animal pigments, and has elaborated a test for distinguishing between the blood pigment of man and that of other mammals, a test which is practicable for medico-legal inquiries.

HUGHES MEDAL.

Prof. Joseph John Thomson, F.R.S.

The Hughes Medal is awarded to Prof. Joseph John Thomson in recognition of his contributions to the advancement of electrical science, especially in connection with the phenomena of electric discharge through rarefied gases.

The explanation of the brilliant and remarkable phenomena attending electric discharge through highly rarefied gas has long remained an enigma, though it was early recognised by Maxwell and other philosophers that the simplicity of the conditions that must prevail in rarefied matter would probably some day furnish the key to much that is fundamental in electrical action. Following at a considerable interval the earlier work of Plücker and Hittorf, the improvement in the production and regulation of high vacua led Crookes into the exploration of a new and very striking class of phenomena, those grouped around the kathode rays, and he adduced much evidence, backed by the authority of Sir George Stokes, to show that these rays consist of streams of electrified particles projected from the kathode to the electric current. The nature and origin of these torrents of particles remained an unsolved question. Though Schuster showed that some kind of subpermanent dissociation of electrolytic character accompanied the electric discharge, his admirably planned attempt to determine the relation between the charges and masses of the kathode particles did not lead to decisive results; while the advances made by Goldstein, Hertz and others in Germany were dominated by the view that the phenomena were due to disturbances propagated in the ether rather than to projected particles. When, in 1889, Prof. J. J. Thomson announced, as the result of his measurements of the magnetic deflection of the kathode rays, their relation to the rays of Lenard, and other properties, that each kathode particle carried the normal electrolytic molecular charge and moved with a velocity which was a considerable fraction of that of radiation, and more especially that the mass of the particles was only about the thousandth part of the mass of the chemical atom, it was felt that, if these conclusions were confirmed, experiment had forced a way into the very ultimate foundations of physical phenomena, into regions which might fairly have been thought to be beyond human scrutiny. Weighty evidence had indeed already been adduced on theoretical grounds that any complete and consistent rationale of the known electrical laws almost demanded that electricity should be of an atomic character, like matter itself; and the magnetic action in spectra, discovered by Zeeman, illustrated and directed attention to this result; but no presumption was anywhere entertained that the electrical atom could so soon become the subject of direct experiment. By virtue of Prof. Thomson's own investigations, and of many others inspired and stimulated by him, this new field of knowledge has been widely extended. It is now known that the conductivities induced in gases by the Röntgen radiation, by chemical action, by radio-active substances, even by a hot wire, are closely connected in character and all take place by electric convection of such ultimate atomic charges.

It can hardly be doubted that the progress of this new department of knowledge will gradually enable us to see one whole stage deeper into the sources of physical phenomena.

NOTES.

AT the meeting of the Royal Society on November 27, the following were elected by ballot foreign members of the Society:—Prof. Waldemar Christofer Brögger, Prof. Gaston Darboux, Prof. Ewald Hering, Mr. George William Hill, Prof. Albert Abraham Michelson, Baron Ferdinand von Richthofen, Graf H. zu Solms-Laubach, and Prof. Julius Thomsen.

THE Emperor of Germany never neglects an opportunity of expressing his appreciation of the important part which science plays in national progress, and his remarks are not only encouraging to workers in all departments of natural knowledge, but also of value in determining the attitude of the public towards scientific work. In a speech at Aix-la-Chapelle in June last, he described the German Empire as mainly intellectual and scientific, and on November 28 he alluded to the same point in the course of a speech delivered at Görlitz, where a "hall of fame" has been erected. From a translation of the text of his speech given by the Berlin correspondent of the *Times*, we take the following extract:—"We stand on the threshold of the development of new forces; our age demands a race which understands it. The new century is dominated by science—which includes technical skill—and not, like the last century, by philosophy. We must be men of the age. Great is the German in scientific investigation, great in his capacity for organisation and discipline. The freedom of the individual, the strong tendency towards development of individuality which is inherent in our race, is conditioned by subordination to the whole for the good of the whole. May the future, therefore, see the growth of a generation which, in the full recognition of these facts, develops in the course of joyous labour individuals who subordinate themselves to the good of the whole, to the good of the people and of the fatherland. Freedom for thought, freedom in the further development of religion and freedom for our scientific investigation—that is the freedom which I desire for the German people and would win for them."

DR. DESLANDRES, astronomer at the Meudon Astro-physical Observatory, has been elected a member of the Paris Academy of Sciences in succession to the late M. Faye.

PROF. E. B. POULTON, F.R.S., will deliver the juvenile lectures at the Society of Arts this year, and has selected as his subject "Means of Defence in the Struggle for Life among Animals." The dates of the lectures will be December 31 and January 7.

WE regret to announce that Prof. Ladislava Celakovského, professor of botany in the Bohemian University at Prague, died on November 24, at sixty-nine years of age.

THE *Times* reports that the Swedish Academy of Sciences has conferred the Nobel prize of the year 1902 for chemistry on Prof. Emil Fischer, professor of chemistry at the University of Berlin, where he succeeded Prof. von Hofmann in 1892.

THE Cape *Agricultural Journal* announces that Dr. A. Loir, of the Pasteur Institute, Paris, has proceeded to Bulawayo to establish a branch of the Institute there for the treatment of rabies by the anti-rabic inoculation method. Dr. Loir is a nephew of the late M. Pasteur, and has been engaged in the establishment of branches of the parent Institute at Sydney, N.S W., and Tunis.

THE death is announced of Prof. O. N. Rood, known by his work in experimental physics. We learn from *Science* that Prof. Rood was born in 1831, and was professor of chemistry and physics at Troy University from 1858 to 1863. For the past thirty-nine years he had been professor of physics in Columbia University. He had been vice-president of the American Association for the Advancement of Science and was a member of the National Academy of Sciences.

THE committee of the class including agricultural practice and agricultural statistics at the Paris Exhibition of 1900 has decided to make a grant of 2400 francs to the agricultural section of the Paris Society for the Encouragement of National Industries, to be employed in agricultural research in such a manner as the committee of the Society determines. In his letter to the president of the Society, M. Tisserand, on behalf of the exhibition committee, expresses satisfaction that such a grant is possible as the outcome of the work of the section of the exhibition represented by him.

THE HON. F. M. ALLEYNE, member of the Legislative Council of Barbadoes, writes to say that in Barbadoes great success has been achieved in the cultivation of sweet potatoes and yams of the very best quality, and an endeavour is now being made to introduce these into this country as vegetable foods. Messrs. W. Pink and Sons, of Portsmouth, are importing regular supplies, and with every parcel receipts are sent for various ways of cooking both sweet potatoes and yams.

A REUTER telegram from Kingstown, St. Vincent, announces that the Soufrière was in violent eruption on November 26. Georgetown and Château Belair have again been deserted. Telephonic communication was interrupted early in the day owing to the fierce lightning. Rumblings could be heard and volcanic clouds seen from Kingstown. According to a telegram from St. Thomas, the steamer *Jare*, which has arrived there, reports that when she passed Mont Pelée on the morning of November 26, the volcano was in violent eruption.

Science states that Prof. J. J. Thomson has been invited to be the first lecturer at Yale University on the Silliman foundation. This lectureship, endowed by the late Benjamin Silliman with 85,000 dollars, is somewhat similar to the Gifford lectures of the Scottish universities, providing for a course of lectures "the general tendency of which may be such as will illustrate the presence and wisdom of God as manifested in the natural and moral world." The lectures, however, must not be "on topics appropriate to polemical or dogmatic theology."

THE lecture which Sir Oliver Lodge delivered to the Institution of Electrical Engineers on November 27 was followed with much interest by a large and appreciative audience. The subject was "Electrons," and the lecturer made it his aim to expound the work which had been done in recent years, work in which the names of Crookes, J. J. Thomson, Stoney and Larmor stand out preeminent, rather than to attempt any new contribution to the theory. This was no easy matter before an audience composed chiefly of engineers, but Sir Oliver Lodge's powers were fully equal to giving a simple exposition of a difficult subject and making clear to his listeners the lines of reasoning involved and the legitimate inferences to be drawn from the experimental work.

REUTER'S AGENCY understands that the work of the Commission dispatched to Uganda some months ago by the Royal Society and the Foreign Office to inquire into the cause of the mysterious malady known as "sleeping sickness," which has made such ravages in Central Africa, has not yet been completed. Dr. Low, the pathologist of the Commission, having finished his portion of the work, is returning home, but Dr. Castellan is continuing his bacteriological investigations in the country, and Dr. Christy, the third member of the Commission, as at present arranged, will pursue his studies along the Upper Nile, by which route he will return to England.

M. CALMETTE has claimed that antivenin, the anti-serum for snake-poison, is to a large extent non-specific, that is to say, cobra anti-serum, for example, would neutralise the venoms of other snakes, though perhaps not so actively as it would cobra venom. This view has been called in question by Prof. Martin and by Captain Lamb, and more recently Dr. Tidswell has found (*Australasian Med. Gaz.*, April 21) that Calmette's antivenin has little or no neutralising power when tested against the venom of the Australian tiger snake.

AT a meeting held last week at the Polyclinic in connection with the Prince of Wales's Leprosy Fund, Mr. Jonathan Hutchinson, F.R.S., gave an exposition of his views upon the propagation of leprosy. He stated that he had come to the conclusion, after much study of the question, that the disease is spread only to a very small extent by anything of the nature ot personal contagion, and that it is a food-disease, the living bacillus being received into the body by way of the stomach. The one article of food which was to be suspected was badly cured fish, eaten without sufficient cooking. Mr. Hutchinson, who has only recently returned from South Africa, is shortly starting for a tour in Ceylon and India in order to investigate the ætiology of leprosy.

WE have received an advance copy of the second edition of Merck's Index. The bulk of the work is devoted to an alphabetical list of the multitude of substances which have been introduced of late years for medicinal use and the majority of which are not to be found in the pharmacopœias. Under each heading, the nature, chemical composition and physical properties, the uses and doses of the substance are indicated. Another useful list gives the composition of various test-solutions that are usually referred to under authors' names and the formulæ for which are often difficult to discover. Other tables give the nature and derivation of the organic substances of the materia medica, nature and composition of minerals, indicators, &c. Altogether, the work is a most useful one, both for the practising physician and for the chemist and physiologist, and should find a place in every laboratory.

A COPY of the catalogue of Aurora Borealis observed in Norway from the earliest times until June, 1878, has been received (xxiii + 422 large quarto pages, Christiania, 1902). This comprehensive catalogue was compiled by Prof. M. Tromholt; he died in 1896, and the laborious task of revising the manuscript and preparing the work for publication was undertaken by his friend, Prof. J. F. Schroeter, of the Christiania Observatory. The first portion of the catalogue gives, in chronological order, the year, month and day on which aurora was observed, together with the district and place, a short description of the phenomenon and the source from which the information was obtained, while a second section contains special descriptions of individual displays. The discussion of the results shows that, as regards the whole country, a maximum in the yearly period occurs about the times of the equinoxes (October and March), separated by a minimum in mid-winter. For the northern part of the country, north of 68° 30′, the yearly period resembles that of the polar regions, with a maximum about the winter solstice. South of latitude 65°, the periods resemble those of middle latitudes. Prof. Schroeter has also tabulated the observations of Dr. Rubenson's catalogue of Swedish auroræ, and shows that the same results hold, for the yearly period, for the whole of Scandinavia, and for individual districts, as obtain for Norway only.

SOME tests on an interesting battery, in which the depolariser is atmospheric oxygen, are described by G. Rosset in a recent issue of the *Centralblatt für Accumulatoren-Elementen*. The cell consists of a zinc electrode dipping into a solution of salammoniac surrounding a porous jar; a semipermeable membrane of ferrocyanide of copper is formed in the interstices of the jar, which contains a carbon rod dipping into an ammoniacal solution of cupric oxide. When the cell is discharging the cupric oxide is reduced to the cuprous state, but this diffuses to the surface and is reoxidised by the atmospheric oxygen. The tests show that the depolarising liquid serves for several discharges without renewal in any way, and the constancy of the E.M.F. during discharge is very good. The starting E.M.F. is about 1·25 volts, and this falls slowly to about 0·78 at the end of twenty or thirty days; the internal resistance is about 2·5 ohms. If the air is kept from the depolariser, the E.M.F. falls considerably, but recovers on its being readmitted.

THE Cambridge Scientific Instrument Company has sent us a pamphlet on the measurement of temperature by electrical means, which describes the different types of resistance and thermoelectric thermometers which they manufacture. These thermometers possess the advantage, not only of being suitable for measuring any temperature up to 1000° C. or 1500° C., but also of enabling the reading to be made at any distance from the place at which the high temperature exists. They thus do for thermometry what electrical instruments have done for electrical measurements; it is possible, for example, to read the temperature, say, of a hospital ward in the engine-room instead of in the ward itself, just as it is possible to read in the central station the electrical pressure at the consumers' terminals. The apparatus described in the list before us ranges from the simple thermoelectric couple or resistance wire in a suitable protecting tube to the elaborate Callendar recorders. Instruments reading direct in degrees centigrade can be supplied with the thermometers. The different purposes for which electric thermometry is the best, and often the only, means of measuring temperature are too numerous to mention; the convenience and high accuracy of the method will further recommend it to all who have under their control operations involving temperature regulation.

READERS of NATURE are familiar with the work which has been done by Prof. Kahlenberg tending to disprove the dissociation theory of electrolysis. A short paper summarising the principal arguments against the theory was read by Prof. Kahlenberg before the American Electrochemical Society last April. We commend this paper to all interested in electrochemical theory, especially to those who believe firmly in "ionisation." Briefly, the charges against the hypothesis of Arrhenius are the following. The very generalisation which gave birth to the theory, that abnormal osmotic pressure indicated an electrolyte, and the converse, has not been supported by further experiment. The theory, if it accounts for anything, only accounts for the behaviour of dilute solutions, and is consequently of very limited applicability. There is no experimental evidence, worthy the name, justifying the application of the theory to fused electrolytes. There is no question but that these charges are well supported, and that the ionic theory, if it has given rise to much useful work, has also greatly checked development in some directions, notably that of research with concentrated solutions. It is also a regrettable fact that writers on electrochemical subjects seem to take a pleasure in expressing *facts* in terms of the ionic theory when there is absolutely no necessity for so doing, which, doubtless, to the non-discerning, gives confirmation, in reality fictitious, thereto; without going so far as Prof. Kahlenberg and asserting that the doom of the dissociation hypothesis is already sealed, we believe that those who write in this way are running a great risk of rendering their contributions unintelligible to future generations of electrochemists.

STATISTICS of the mineral production in India for the years 1892 to 1901 have been issued by the Department of Revenue and Agriculture (Calcutta, 1902). The output of coal has increased from 2½ to more than 6½ millions of tons. In the same period, the production of gold has trebled, being 531,766 ounces in 1901, the value being about two millions sterling.

WE have received the general report by the director, Mr. C. L. Griesbach, on the work of the Geological Survey of India for the year ending March 31, 1902. There are brief reports on the field-work carried on in the Madras Presidency, in Burma, Assam, the Punjab, the Himalayan Ranges, Baluchistan and Sind. Inquiries into the occurrence of gold, copper and coal were made in certain districts, without, however, any important economic results. Some of the so-called old workings for gold which abound in Chota Nagpore are nothing more than old prospecting shafts and trenches, and were probably abandoned without the discovery of any paying reefs. One narrow reef gave encouraging results, but only a small outcrop was observed. Prof. R. Zeiller has completed a report on the flora of the Lower

Gondwana Series (permo-Triassic), and this is published with seven plates in the *Palaeontologia Indica* (new series, vol. ii., 1902).

The annual report of the Geological Commission of the Cape of Good Hope for 1900 (dated 1902) has only just been received. The operations of the Survey were naturally hampered by the war, and the main work was in the districts on the west of the Karoo, including the Cederbergen and part of the country between these mountains and the sea. It was carried on by Messrs. A. W. Rogers and E. H. L. Schwarz, under the direction of Dr. Corstorphine, who has since resigned his position. Their labours have resulted in the discovery of a new formation, the "Ibiquas Series," comprising slates, sandstones and conglomerates, which overlie the Malmesbury beds and underlie the Table Mountain Sandstone. Evidence of local glacial action has been met with in the Table Mountain Sandstone. The Dwyka Conglomerate has been found to rest with marked unconformity on the older rocks as it is traced northwards. Basic dykes and sheets of the same type as those intrusive in the younger rocks of the central Karoo, have been found in nearly all of the older series of strata.

We have received a report on the Terlingua quicksilver deposits of Brewster County, Texas (*Bulletin* No. 4 of the University of Texas Mineral Survey, 1902), by Mr. B. F. Hill, under the direction of Prof. W. B. Phillips. It is mentioned that at Comanche Spring, a small "seep," seven miles north of the Rio Grande, the limestone bluffs have been covered in a number of places with rude paintings of characteristic Indian design. The artists were without doubt the Comanche Indians, and the vermilion pigment was prepared from cinnabar. Of late years, researches have been made in the district which show that cinnabar and also native mercury occur in the Cretaceous limestones, clays and shales. These strata are invaded by eruptive rocks, to the presence of which the quicksilver deposits are considered to be indirectly due, the ore having been formed from hot springs. The cinnabar is found in definite crystals and in large amorphous masses; other mercury compounds likewise occur, while the native quicksilver is generally mixed with crystalline masses of calcite, and occupies the interstices between them sometimes in a quantity weighing twenty pounds.

The second part of the *Aarbog* of the Bergen Museum for the current year contains a paper, by Mr. D. Bergendal, on Arctic nemertine worms, in the course of which several new generic and specific types are described. One of the former, Hubrechtella, is named in honour of the illustrious professor of zoology at Utrecht.

By the discovery of those of the great black species (*Calyptorynchus macrorhynchus*), which are laid in the hollow branches of gum-trees, Mr. D. le Souëf (*Victoria Naturalist*, vol. xix. No. 6) has succeeded in filling the one remaining gap in our knowledge of the eggs of Australian cockatoos.

Asymmetrical development of the tracheal tubes in the fore-wings of a female specimen of the North American moth *Telea polyphemus* affords, according to Dr. G. Enderlein (*Zool. Jahrb.—Abtheil. für Anatomie*), important evidence as to the phylogeny of the Saturniidæ and the developmental history of the Lepidoptera in general.

Morphologists will be much interested in a paper, by Mr. E. Starks, on the shoulder-girdle of the hemibranchiate fishes (sticklebacks, flute-mouths, trumpet-fish, &c.), published in No 1301 of the *Proceedings* of the U.S. Museum. Many emendations on previous determinations are made, and it is urged that the group is certainly entitled to rank as a suborder of equal value with the Percesoses.

The phylogeny of the Proboscidea forms the subject of a paper by Dr. F. Ameghino published in vol. vii. of the *Anales* of the Buenos Aires Museum. The author attempts to show that the Patagonian genius Pyrotherium, which he regards as of Upper Cretaceous age, is the proximate ancestor of the group in question. This form, or its descendants, migrated into Africa, where it gave rise to the recently discovered Palæomastodon and Mœritherium, the former of which is admitted to be the progenitor of the mastodons; the latter spread over the world until one of them reached South America, the home of its ancestors! If, as is quite possible, Pyrotherium is really a proboscidean, it has to be proved, before the author's views can be accepted, first, that it is of Cretaceous age, and, secondly, that it is not itself an immigrant from Africa. It will be unnecessary to follow the author in his attempt to derive Pyrotherium—and so elephants—from a Jurassic (?) South American marsupial.

The *Monthly Review* for December contains the first part of a contribution by the Rt. Hon. Sir Edward Fry, F.R.S., on the age of the inhabited world and the pace of organic change.

The annual report of the Liverpool Astronomical Society, a copy of which has just been received, contains an interesting address by the president, Mr. W. E. Plummer, upon the various departments of astronomy in which observers, with or without telescopes, may do useful work if they are inspired by the true scientific spirit.

We have received numbers 6-11 of vol. xi. and numbers 1-8 of vol. xii. of the *Transactions* of the Academy of Science of St. Louis. The separate parts are each devoted to a single subject, and there is no regular interval of time between the publication of consecutive issues. Many of the contributions are of direct interest only to American men of science, while others will appeal to scientific workers everywhere. Among the latter class in the numbers of this year may be mentioned Mr. A. S. Chessin's essays on the true potential of the force of gravity and on the motion of gyroscopes; and in vol. xi., the reviews of the progress in physics and botany in the nineteenth century, by Prof. F. E. Nipher and Dr. William Trelease respectively, and the paper on some interesting molluscan monstrosities, by Mr. F. C. Baker.

The October number of the *Journal* of the Sanitary Institute (vol. xxiii. part iii.) contains the addresses to the various sections at the Manchester congress of the Institute. Sir James Crichton-Browne spoke upon the dust problem, and gave an analysis of the dust from a bedroom which contained more than 50 per cent. of organic matter, fragments of animal and vegetable fibres, epithelial scales, starch granules and pollen. Prof. Delépine discussed the epidemic of arsenical poisoning which occurred in the north in 1901, and stated that with Reinsch's test less than one part of arsenious acid in 10,000,000 parts of beer can be detected. Prof. Sherrington gave an interesting address upon school hygiene, and Dr. Shaw one upon the treatment of smoke, printed in Nature of October 30 (vol. lxvi. p. 667). The popular lecture by Sir W. J. Collins was entitled "The Man *versus* the Microbe," in which he suggests that our views upon the specificity of disease and the immutability of bacteria should be modified in the light of the doctrine of evolution.

The thirty-fifth volume of the "Journal and Proceedings of the Royal Society of New South Wales," covering the year 1901, provides convincing evidence of the scientific activity which exists in many of the important countries of the British Empire. From time to time, similar portly volumes are received from various colonies, all containing numerous important contributions to science, and it becomes increasingly difficult for a worker in any branch of knowledge to acquaint himself even with the new researches of British men of science. The volume before us contains, in addition to the annual address by the retiring president, Prof. A. Liversidge, F.R.S., three contributions by the new president, Mr. H. C. Russell, F.R.S., one of which briefly discusses the relation between the moon's motion in declination and the quantity of rain in New South Wales, in which the author is convinced that "seeing the rain is shown so clearly to come in times of abundance, when the moon is in certain degrees of her motion south, and when the moon begins to go north, then droughty conditions prevail for seven or even eight years, a phenomenon repeated for three periods of nineteen years each, that it is either a marvellous coincidence, or there is a law connecting the two phenomena." Mr. R. H. Mathews contributes an important paper on "The Thurrawal Language," and shorter accounts of some aboriginal tribes of Western Australia and of rock-holes used by aborigines for warming water. Mr. J. H. Maiden, Government Botanist and Director of the Botanic Gardens, Sydney, gives an exhaustive summary of the gums, resins and other vegetable exudations of Australia, as well as interesting historical notes relating to the death of Captain Cook. Mr. G. H. Knibbs also writes two important papers, that on a theory of city design being of wide interest. These papers by no means exhaust the important contributions to science contained in the volume, but since reports of the proceedings of the Society regularly appear in our columns under "Societies and Academies," it is unnecessary to refer at any greater length to the scientific work being done in New South Wales.

THE additions to the Zoological Society's Gardens during the past week include two Vervet Monkeys (*Cercopithecus lalandii*) from South Africa, presented by Miss Barlow; an Equine Antelope (*Hippotragus equinus*) from Bechuanaland, presented by Major Chas. Fredk. Minchin, D.S.O.; three Fat Dormice (*Myoxus glis*) European, presented by Dr. L. H. Gough; a Mongoose Lemur (*Lemur mongoz*) from Madagascar, two Mexican Snakes (*Coluber melanoleucus*) from Mexico, deposited; two Snake Fishes (*Polypterus senegalus*) from Fashoda, received in exchange.

ERRATUM—In parenthesis near the end of letter on "Summer and Winter" (p. 81), "The average mean temperature of summer below 61°·2," for *below* read *being*.

OUR ASTRONOMICAL COLUMN.

OBSERVATIONS OF THE PERSEID SHOWER.—Herr Koss, director of the Pola Observatory, communicates to No. 3830 of the *Astronomische Nachrichten* the results of the observations of Perseids made at that observatory on August 8, 9 and 10.

The times of appearance, the exact path, the magnitude and the time of duration of each meteor are recorded for ten Perseids seen on August 8, sixteen seen on August 9, and thirty-three seen on August 10. In addition to these, thirteen Perseids and sixteen sporadic meteors were seen, but not mapped.

The position of the radiant point for August 9 and for August 10 was estimated to be $\alpha = 2\text{h. } 32\text{m.}$, $\delta = +56^\circ{\cdot}5$ and $\alpha = 3\text{h. } 2\text{m.}$, $\delta = +54^\circ{\cdot}5$, respectively

NEW VARIABLE STAR, 16, 1902, DELPHINI.—From photographs taken at Moscow by M. S. Blakjo, Madame Ceraski has found that the star B.D. + 16°·4290, having the position $\alpha = 20\text{h. } 25\text{m. } 59\text{s.}{\cdot}5$, $\delta = +16^\circ\ 57'{\cdot}2$ (1855), is a variable.

In the catalogue, the magnitude of this object is given as 9·3, and this was confirmed on a negative taken on August 18, 1900. On a plate obtained on August 17, 1901, however, the star does not appear, and, according to the magnitudes of the neighbouring stars which do appear, it must therefore have been fainter than the eleventh magnitude. Visual observations confirmed this latter value (*Astronomische Nachrichten*, No. 3830).

EVOLUTION OF AËROGRAPHY.—In No. 170 of the *Proceedings* of the American Philosophical Society, Mr. Percival Lowell reviews the various steps which have taken place in our knowedge and mapping of the surface of Mars.

By a series of twelve maps, arranged in chronological order, he shows the gradual development in the amount of detail seen and recorded, from the map of Beer and Madler, published in 1840, to that published by himself in 1901. From comparisons of these maps, he divides the history of aërography into three periods, viz., 1840–1876, large dark and light markings shown; 1877–1892, "canals" in bright regions detected; 1893–1902, "canals" in the dark regions detected; and also draws the following three deductions therefrom:—(1) The series agree fundamentally. (2) The regularity of the "canals," as recorded by Schiaparelli, was not due to any predisposition on the part of that observer, but was gradually forced upon him as he became more familiar with the surface of the planet. (3) All the maps show a general evolution, from simple to complex, in the detection of the surface markings of the planet.

A SIMPLIFIED FORM OF FOUCAULT'S PENDULUM.—The reinstallation of Foucault's famous experiment at the Pantheon by MM. Berget and Flammarion has, according to M. D'Arsonval, called forth many ingenious devices for proving the same result by means of a simpler apparatus.

Of these devices, M. D'Arsonval describes, in the *Comptes rendus* for November 17, the one which, in his opinion, is the simplest and best.

The main point of this device is the simplicity of the method of suspension. A steel wire, 0·035mm. in diameter, carries a leaden ball, which is covered with copper and weighs about 2¾ lbs., and is fixed to the ceiling by an ordinary nail. Its upper end is then clamped in a metal block, so that it is immovable above the lower face of the block, but free to swing about the point where it enters this face from below, and the block is then screwed to the ceiling or other suitable support. A pendulum suspended in this manner is capable of swinging for about three hours.

The whole apparatus is contained in a small wooden box, which also carries the sand in which the pendulum pointer marks the trace of its plane of swing, and is accompanied by a small model pendulum, which may be used to illustrate the principle of the invariability of the plane of oscillation.

The simplicity, the compact form and the low price (20 francs) of this device should render possible its use in schools and colleges, where hitherto the students have had to depend upon descriptions and illustrations for their knowledge of this important experiment, or else pay a visit to the western galleries of the Victoria and Albert Museum, where a large model may always be seen and, if formal representations be made to the authorities, demonstrations may be given.

PHYSICAL CHEMISTRY APPLIED TO TOXINS AND ANTITOXINS.

A VERY important contribution to our knowledge of the toxins and antitoxins is contained in the "Festskrift" recently published to celebrate the inauguration of the State Serum Institute at Copenhagen, in the form of a paper with the above title by Arrhenius and Madsen. In passing, we note with pleasure that English has been chosen as the international linguistic medium for the entire contents of the volume. The necessity for collaboration between the representatives of different branches of science for the satisfactory study of many of the complex problems of physiology, bacteriology and pathology is gradually becoming generally recognised, and in the present instance we have a striking example of the joint work of two celebrated investigators on a subject lying on the common boundary of their special provinces of knowledge and experience.

It is well known that tetanus toxin, prepared by filtering off the bacteria from a broth culture and saturating with ammonium sulphate, contains two distinct toxic substances, a *spasmin*, which produces the characteristic convulsions, and a *lysin*, which hæmolyses the red blood corpuscles of many animals. In the same way, the antitoxin produced in the serum of animals immunised against tetanus contains two distinct antitoxic substances, an *antispasmin* and an *antilysin*.

It has, moreover, been shown by Madsen that experiments on the properties and mutual relationships of the tetanus lysin and antilysin can be performed with great facility and comparatively great accuracy on blood *in vitro*, the uncertainty attendant upon animal experiments and the great expenditure of time required by them being thus avoided.